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ABSTRACT

The Camp Chinkapin program, begun in 1957-58 as a pilot program for the State of Oregon, provides all sixth grade students in Crook County (Oregon) with a 5-day session in a resident camp setting in the early summer. The book serves as an introduction to and workbook for students attending the Crook County Outdoor Classroom at Suttle Lake. The book includes a camp map, rules and duties, and information about living conditions and counselors. There is information regarding growth zones in route to the camp and the geology of the site. Workbook exercises and activities include work with a map and compass, and the basics of land surveying in Oregon and Washington; weather; "pyramid of life"; geology of the earth and of Oregon; soil and water study, resource relationships; forest influences; tree study, including determining the age of trees; vocabulary; procedures to follow when lost in the woods; wildlife; field study of animals and plants; and creative writing. (SB)

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Camp Chinkapin

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Crook County School District
Prineville, Oregon

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History of the Crook County Outdoor School

by Evelyn Elkins

The Outdoor Education plan began in 1957-1958 school year. This was a pilot program, which means it was the first in the state, carried on to learn the best ways to run other such schools in Oregon. Crook County, in other words, was a "Guinea pig". The Crook County Schools and the State Department of Education together planned this first camp school which was held at Camp Tamarack near Sisters, Oregon. Since the State was going to use the knowledge and information gained here, they paid about half of the cost and our school board paid the other half. Margaret Mikkiken, of Oregon State College, and Austin Hamer, of the Oregon State Game Commission, helped plan and organize this school week in the woods. County School Superintendent, Cecil Sly was a great promotor of this program and was supported by our school board, who granted the necessary funds.

The camp took place May 12 through May 16, 1958 and was attended by 32 sixth grade students for a five day period. Miss Milliken directed the program and Mrs. Ellen McCormack was the classroom teacher. A film was made of the program by Oregon State University entitled "Mrs. McCormack's Outdocr Classroom." The film has been used throughout the United States to encourage and explain the use of the outdoors for teaching science, conservation, and other subjects in an outdoor environment.

Pupils, parents, and staff were so enthused with the pilot program that the school administration and school board decided to continue it. They had to take over the full cost. Two classrooms were sent in 1959 and all Prineville 6th grades in 1960. The program proved so successful that in 1961 all pupils in Crook County 6 th grades were sent and that has been done ever since. The first camps were for five days; camp duration was increased to six days, but put back to five days which seems to be the best plan (Monday morning until Friday afternoon).

During the 1958 and 1959 sessions camp was operated by college counselors trained by Miss Milliken. The next three years camp was manned from our High School under college counselors. No college counselors were available in 1963 and we found that we could run camp very nicely with none but our own high school counselors. During the early years of camp, only senior or junior students were accepted, but now counselors may be sophmores, juniors, or senior students. It takes three weeks of camp to accomodate all sixth graders. Each week requires 15 or more counselors to help the camp director. Miss Milliken was the original director. In 1962 directorship was taken over by intermediate teachers who have directed all camps since that time. In 1964 camp location was changed from Tamarack on Dark Lake to Methodist Youth Camp (Chinkapin to the campers) on Suttle Lake.

An article recently appeared in a Portland paper describing how camp is run all year in Portland, renting various within-reach camps, in order to enable all sixth graders to have this experience. Crook County is honored that it was chosen to do the pilot program. Our pilot program of 1958 has been a tremendous success!

Acknowledgement: Cecil Sly's history of camp schools was the basis of this report. His material has been added to and brought up to date.

To: Sixth Grade Students

This book is your invitation and introduction to participation in the Crook County Outdoor Classroom. Some of you have been looking forward to "camp" because others in your family have attended before you. For some this will be a completely new experience and you're not just sure how you will feel about it.

Well, it will be a growing time for all of you. The camp site is in a beautiful setting and the whole outdoors will be your classroom! You will leave home and family, but you will be with friends and teachers you know and on whom you can rely. Every attention is given to the care, safety and feeding of all individuals involved in this week-long activity.

Our 6th grade staff and camp director do an outstanding job in preparing a variety of interesting learning activities and recreational experiences. Community resource people will give interesting demonstrations and share their discoveries with you during your stay at camp.

To get the very most from this special week, it is necessary for you to prepare yourself. Spend some time thinking about how we fit into nature, what it will be like to live and work in a large group and how you can make this a successful week for yourself and for all with whom you come in contact.

It is felt that you will find the Outdoor Classroom to be a very worthwhile experience. Go with great expectations, and return with happy memories and new discoveries about yourself and our world.

THE OUTDOOR CLASSROOM ON THE TRIP TO CAMP

There are many things of interest that you can observe and learn about on your bus trip to camp. These things can be of interest to you on future car trips with other people, and if you can master and remember them, you will find it will give you a great deal of pleasure to point out and discuss this new knowledge with your friends and family when next you have a chance to do so.

From the plateau, as you near Powell Butte, you have a fine view of the peaks of the Cascades. Just west of Redmond there is one spot from which you can even see Mount Hood. The big, blue looking peak, with the white top which you can always see a little to the right and closer than the white peaks, is Black Butte. You will pass along this on the south side of the highway a few miles before you turn off the highway to the left, on a turn-off road that takes you into Camp Chinkapin. There is a Forest Service lookout on this butte which you may be able to see at some points of your journey. When you are about half way to Sisters from Redmond, look at the butte right in front of you and see if you can see the crater in the side facing you. This is Black Crater just south of the McKenzie pass. This crater is like a huge cup, three or four hundred feet deep, and was formed by volcanic action. Trees grow down inside this cup. There is a hiking trail down inside this cup from McKenzie Highway at Windy Point, a few miles this side of the pass. It is a popular trek with Scout troops.

From the map, see how many of the peaks you can identify. The Sisters peaks are over 10,000 feet in elevation. Mount Hood is 11,245 feet high and is the greatest of our Oregon peaks. There is a skyline trail that follows the Cascades from Washington to California. It is passable to hikers and horseback riders who want to visit our wilderness areas. These travelers of the trail find the land as it was hundreds of years ago, with no sign of man's work except the trail they travel. Since this trail runs north and south and all the highways across the Cascades run east and west, hikers and riders can enjoy any segment of this trail for they can enter it from any mountain pass. See if you can find a skyline trail sign.

GROWTH ZONES ON THE TRIP TO CAMP

Scientists divide areas of our country into zones according to the plant life that they find growing in various areas. These zones grow a certain type of vegetation mainly because of two reasons. These two determining factors are the amount of rainfall and elevation of the land. There are other things that have influence on these zones, but they are more of a local nature for small areas. The exposure or the direction toward which a land slopes, is one of the more important of these lesser things which determines the zone growth too. In this part of the world, slopes that face the south are warmer and tend toward the drier zone growths, while slopes that face the north are damper and cooler and often produce plant life that belongs to a damper zone. In a very small cup-shaped dell, we may have vegetation of three or four zones. You will enjoy finding out more about this when you get to camp. This great number of zone growths in so small an area is due altogether to the direction the different sides of this cup-shaped land face--north, south, east or west.

We do not expect all to know these zones, but some of you will be interested in knowing their names and what is found there. When you know these names, you can tell a lot about elevation and climate and rainfall of an area by just observing what grows there. Next there is a list and brief description of growth zones.

GROWTH ZONES

I. ARTIC ALPINE:	No trees; spectacular flowers; plants have a heavy leaf rosette at their bases all are very hardy, don't freeze; high altitude, above tree line.
II. HUDSONIAN:	Alpine fir; white bark pine (5 needles but different from western pine); mountain hemlock; high altitude, just below tree line.
III. CANADIAN:	Permanent winter snows; most conifers are found here; principal trees are lodgepole pine and Engelmann spruce.
IV. HUMID TRANSITION:	Zone of greater moisture; Douglas fir is principal tree; much underbrush; numerous kinds of plant life in the form of ferns, grasses, shrubs.
V. ARID TRANSITION:	Ponderosa pine is principal tree; shrubs--bitterbrush, manzanita, and snow brush (also known as cinnamon bush, sticky laurel); rather open under trees with little underbrush.
VI. UPPER SONORAN:	Dry, desert-like; sagebrush and juniper.

When you leave Prineville, you are traveling through the Upper Sonoran Zone. Look at the trees and shrubs. What are they? Juniper and sagebrush always indicate this zone.

After you leave Redmond, watch carefully to see who can find the first indication that you are coming into another zone. You will see some ponderosa pine before you get to Sisters. What zone do these indicate? Why do these trees grow here--why not sagebrush and juniper? Could it be because they are closer to the mountains, thus making the elevation higher and in turn causing more precipitation?

After you go through Sisters, you are very definitely in this new zone--the Arid Transition Zone. Watch for the bushes that are listed for that zone. The bitterbrush that grows along this stretch of highway is a fine stand. These bushes are very large for this shrub. Bitterbrush is the finest deer, sheep, and cattle graze found on Central Oregon range land. The animals like it and it is very rich in protein food value and so is very nourishing. You will see aspen trees at Indian Ford. Aspen trees are often found in this zone in damp places. Watch carefully for the next stand of aspens (at the base of Black Butte) and determine why this stand is here.

Between Sisters and Indian Ford--about two miles west of Sisters--you will see a certain road leading to the right of the highway. This road is easily distinguished from other side roads because of the cinders with which it is covered. This road leads to a cinder cone--a volcanic formation. This cinder cone and others nearby are used by the road builders as a source of fine rock to make roads firm and good for travel. These cinder cones were formed in such a way that this rock does not need to be crushed. Sometimes there are large chunks that need to be thrown out, and for some uses the material is screened, but often it is put on the road just like they dig it from those cones--which are shaped like huge ice-cream cones turned upside down. Some of the cones produce red cinders and some produce very black cinders.

Soon after you pass Indian Ford and are traveling around the base of Black Butte, watch for the first signs of a new zone. If you look carefully, you will see cedar trees--bright lighter green foliage on thickly placed branches. The cedars will be on your right. At about the same time, you will see a very thick stand of lodgepole pine on your left. You will still have ponderosa pines on the right of you--but with other things mixed in-gradually at first and then more until the pines are very few and you will know you have again changed zones. The lodgepole pines belong to other zones than the Canadian zone. They are often the first trees to reseed a burned are after a fire. It is possible this is what might have happened here, although we would have to check more before being sure. We have just seen things from several zones, which means that the zones are bordering here. We often have these mixtures at the edges of zones.

Very soon now you will see a sure sign of this zone that replaces the Arid Transition zone of the ponderosa. See who can be first to see a "Christmas Tree" the beautiful white fir with its very dark green foliage and its limbs evenly spaced like spokes of a wheel. There will be lodgepole pines here and there, too, but the big trees are still the ponderosa and you are now in a completely new zone. Here you find more Douglas fir, white fir and a few western white pine. There is much more underbrush. This is the Humid Transition zone, as you will note if you check your list of zones.

Around Camp Chinkapin you are in a mixed-up group of zones. You see signs of all the zones we have so far encountered on this trip. Maybe a little hill gets a little more moisture than a nearby area. It will tend toward the Humid Transition of the Douglas fir. Sometimes the soil holds water better in one place than another. The direction toward which the hill slopes is probably the greatest deciding factor of what will grow here in the Suttle Lake area. On the south exposure of a hill, you will see ponderosa and if the soil is really rocky and dry, maybe even a small juniper of the Upper Sonoran. On the north slope you will find thickets of underbrush and fir trees which may be either Douglas or white fir. On the east and west slopes, you will probably find a mixture of all of these. See what you can decide about these things as you become acquainted with the Suttle Lake terrain.

SUTTLE LAKE GEOLOGY

At one camp session a few years ago, Phil Brogan, a prominent Central Oregon Geologist, came and talked to the campers at an evening program. He told of the formation of Suttle Lake. A great ice sheet at one time covered this area. In its travels, it gouged out holes and dumped piles of sand and stones. The dump piles of the glacier are called moraines. Suttle Lake is where a hole was scooped out and it filled with water because a moraine was dumped across the lower end of this trough, making a dam.

Moraine soil is very gritty and sandy and filled with boulders, large and small. When a bulldozer dug the hole for the basement of our camp lodge, the driver found his job made more difficult by the marble-like boulders that were scattered all through the material he had to dig out. They ranged in size from fist size up to some as high as you are tall. If you walk out to the highway, turn left and walk along the highway toward the Lake Creek bridge, in the road bank on your left you will see a fine example of what the inside of a moraine looks like. Note the round boulders of all sizes. The soil around these boulders is very gritty and rock-like as is all the soil of our plots. All of the plots are on this moraine that dammed the trough and made Suttle Lake. The layer of humus and rich soil here is very thin because, in the language of the geologist, this is a very young land and nature has not had time to break down the rocks and sand and build them into rich, moisture holding soils, but if you will look about you, you will see much evidence that this process is under way.

Some of you, long after camp days are over, will have fun showing off your skill in identifying landmarks and naming zones and telling what they stand for. And the short story of Suttle Lake Geology, we might hope, will arouse in a few of you, an interest in learning more about how this Cascade Range and its dimples and knolls, came to be.

This land and its climate is the environment; everything that lives and grows is a living organism. You are here to study and observe this ecology--the relationships between all the living organisms and their environments. We hope you can end your camp days with a better understanding of the great importance it plays in the future of you and all other living people and things upon this earth.

C A M P R U L E S

1. ONLY ACCEPTABLE LANGUAGE AND ACTIONS ALLOWED.
2. EACH ONE IS QUIET WITH NO TALKING WHEN FORMING FLAG CEREMONY CIRCLE.
3. ONLY QUIET TALK OR ACTIVITIES DURING QUIET TIME.
4. KEEP SILENCE IN LINE TO AND IN THE DINING HALL UNTIL AFTER THANKS HAS BEEN GIVEN.
5. ALL ARE ABSOLUTELY QUIET AFTER TAPS.
6. ALWAYS WALK. RUNNING IS ONLY PERMITTED IN CERTAIN AREAS.
7. GO NEAR THE WATER ONLY WHEN ACCOMPANIED BY A STAFF PERSON.
8. KEEP TO THE TRAILS, UNLESS INSTRUCTED TO DO OTHERWISE.
9. STAY WITHIN IMMEDIATE CAMP AREA UNLESS ACCOMPANIED BY A MEMBER OF THE STAFF.
10. ENJOY YOURSELF AND FRIENDS EVERY DAY.
11. RESPECT PROPERTY OF YOUR OWN AND OTHERS.
12. RESPECT YOURSELF, YOUR FRIENDS AND AUTHORITY.

MY DUTIES:

SPIC & SPAN

PEARL DIVER

JOHNNY JUMP UP

ROUSTABOUT

WOODCHUCK

HOST OR HOSTESS

WEATHER REPORT

FLAG CEREMONY

11

MY COUNSELORS:

_____
Living Group

_____
Plot Study Group

_____
Program

MY LIVING GROUP

NAME _____

PLOT STUDY GROUP

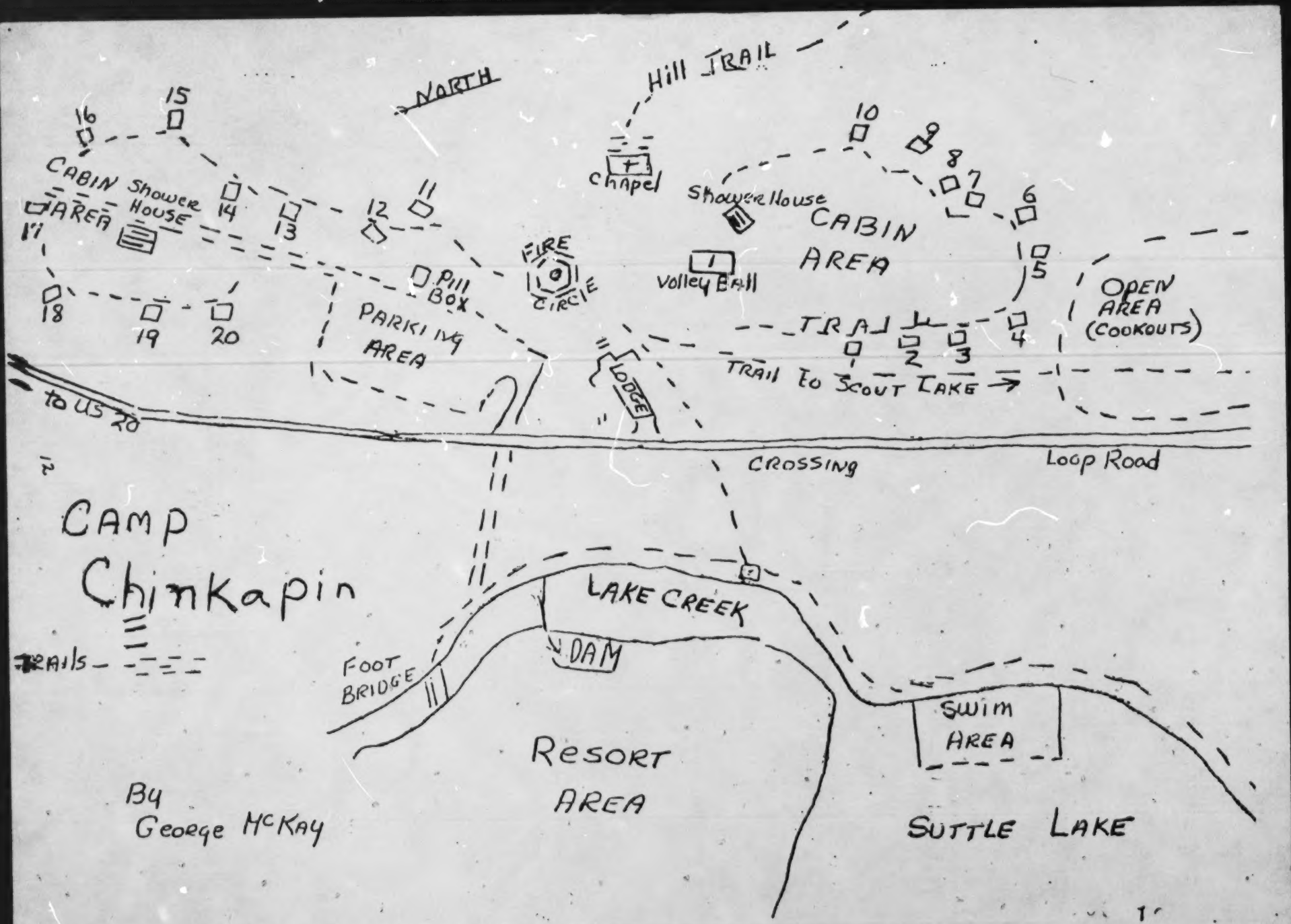
PLOT STUDY TEACHER

WILDLIFE STUDY

FORESTRY STUDY

PLANT STUDY

PLOT CONSULTANTS


NORTH
Hill TRAIL
chapel
Shower House
CABIN AREA
Volley Ball
FIRE CIRCLE
Pill Box
PARKING AREA
CABIN Shower House AREA
OPEN AREA (COOKOUTS)
TRAIL
TRAIL to Scout LAKE
LODGE
to US 20
CROSSING
Loop Road
Camp Chinkapin
Trails
LAKE CREEK
DAM
FOOT BRIDGE
SWIM AREA
Resort AREA
SUTTLE LAKE
By George McKay

WORKING WITH MAP AND COMPASS

1. Using your compass, construct a circle four inches in diameter.

2. At the center point of the circle, construct four right angles and extend the rays to the circle. Label the points where the the rays touch the circle north, east, south, and west.

3. Place 360 degrees above the north point. According to the azimuth scale, this is the total number of degrees in a circle. North can also be labeled 0 degrees.

4. At the east point place 90 degrees. If one quarter of the circle is 90 degrees, then south would equal _____ degrees and west would equal _____ degrees. Label these points.

5. On a map or compass, north, south, east, and west are known as the cardinal points. Distances half way between cardinal points are known as intercardinal points. Divide the right angle represented by north and east into half, or 45 degrees. Draw a ray from the center point of the circle to the circle and label this new point northeast. Label it 45 degrees. The next intercardinal point is southeast which has an azimuth reading of _____ degrees. Construct it. Construct and label the remaining two intercardinal points.

USING THE COMPASS

A compass is a device for determining direction on the earth's surface by means of a magnetic needle, swinging on a free pivot and pointing to the magnetic north.

General

Direction in the out-of-doors cannot always be determined by the orientation of a map or the position of the sun in the sky. This is when a compass becomes valuable.

Using the compass can be easy if you practice with the following instructions.

Parts of the Silva Compass

There are different kinds of compasses, but we will discuss only the Silva compass. The compass housing is divided into 360 equal parts numbered clockwise in consecutive order. Each equal part is call an azimuth or a degree. There are three main parts to a compass:

1. Compass needle - the red end points to magnetic north and the white end points south.

2. Compass housing, in this instance, is an aluminum dial with an azimuth circle marked on the outside. The space between each line marked on the housing represents two degrees. There are four main azimuths on a compass - North (0^{o} and 360^{o} azimuth), East (90^{o} azimuth), South (180^{o} azimuth), and West (270^{o} azimuth). An orienting arrow also appears on the inside of the bottom of the housing.

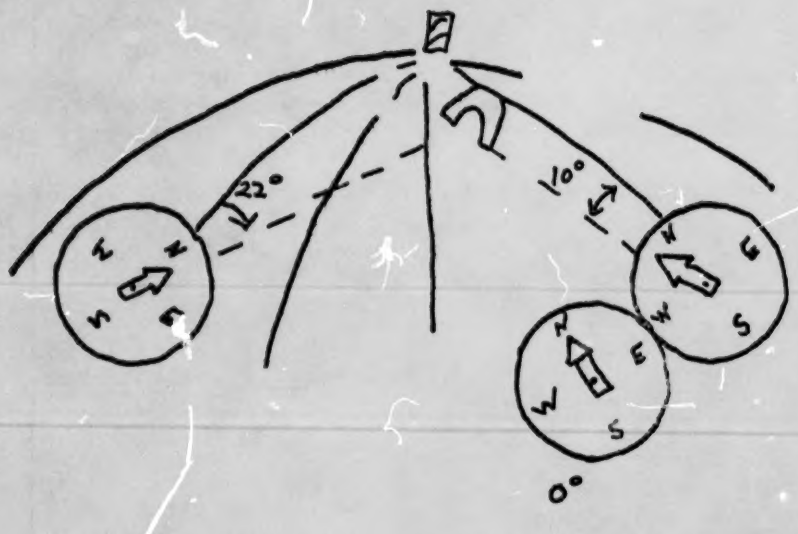
3. The base plate is used to indicate the line of travel as shown by the "direction of travel arrow" on the plate. The base can also be used to scale distances on a map.

Declination

The compass needle points to magnetic north. Maps and land surveys are made on the basis of true north. This is necessary because magnetic north is some fourteen hundred miles distant from true north. Since all maps are made on a true north bearing and the compass needle points to magnetic north, an adjustment must be made on the compass to compensate. This difference is known as the angle of declination.

1. Angle of Declination

   In different parts of the country the angle of declination varies. This is one reason why manufacturers do not build this correction right into the compass. Declination in Oregon and Washington is about -22.



COMPASS DECLINATION

Since we are west of the declination zero line, our compass needle will point east of true north as it is shown in the above illustration. This is called easterly declination. We would always add our easterly declination to a magnetic compass bearing to get a true bearing. An average declination for Oregon and Washington is -22 /

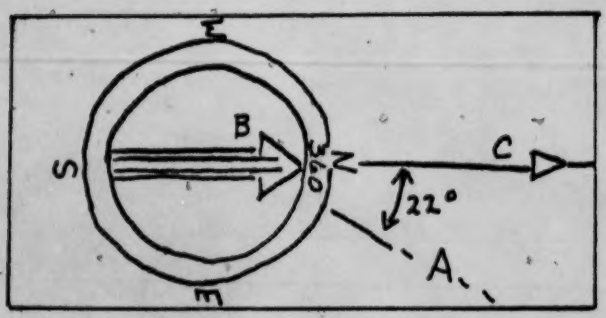
(Note: The following adjustment on your Silva compass will simplify future corrections for declinations eliminating need to add or subtract declination).

2. Adjusting the Compass for Magnetic Declination

Set the 260 (or 0) azimuth on the "direction of travel" arrow, C, as shown in the diagram below.

Opposite the correct declination for this area (-22) scratch a line into the plastic base. This is called the "azimuth line", and is shown by the letter A in the diagram below. Ink the scratch line or "azimuth line". with black or red India ink to make it stand out.

Once the proper declination has been set off in the compass, all bearings will then be read from the azimuth line.



A - Etched azimuth line

B - Orienting arrow

C - Direction of travel line

Correction for declination

TAKING A COMPASS BEARING

Hold the compass with both hands in front of you and with your arms against your body, the direction of travel arrow should be pointing away from you. Point the direction of travel arrow directly at the object you wish to walk toward. Turn the compass housing until the magnetic arrow and the orienteering arrow underneath it coincide with each other. This is know as boxing the compass when both arrows coincide with each other. Read the compass bearing at the scratch. This is your bearing from true north.

DETERMINING YOUR STRIDE

While at Camp, you will construct to scale a map of your plot. This is accomplished by using a Silva compass and your stride, which determines distance. A stride is equal to two steps. Here is how to determine your stride. Mark off a 100 foot distance. Starting with your right foot, step out and say, "Right, one, Right, two, etc" until you reach the end of the 100 foot distance. Each time your left foot touches the ground you are counting your stride, or every two steps. Each time you walk the 100 foot distance, record the number of strides in the blanks below. Find your average stride by dividing total strides by number of times you recorded your stride. Round your stride off to the nearest foot.

1. _____ 6. _____

2. _____ 7. _____

3. _____ 8. _____

4. _____ 9. _____

5. _____ 10. _____

TOTAL STRIDES = _____

RECORDED NUMBER OF STRIDES = _____

AVERAGE STRIDE= _____

DRAWING A PLOT TO SCALE

First, you need the dimensions of your plot and the compass bearings of the corners of your plot. Start by observing the plot as to the number of corners it has. Make a similar sketch on your paper and number the corner you are beginning at as number one. Point the direction of travel arrow at corner two, box the compass, record the compass bearing from the scratch, put the compass away, begin with your right foot and count the number of strides it takes you to walk in a straight line to corner two. Record this number of strides. Repeat this process for all sides of your plot.

With this information you are ready to construct your map. The first step is to orient your graph paper to true north. Label the top of your paper north, bottom south, left west, and right east. Lay your compass on your paper so that the direction of travel arrow is pointing to north. Place 360 degrees on the scratch. Without touching the compass, turn the paper and the compass until the compass is boxed. Since the compass is pointing to the true north and the top of your paper is north, you have now oriented your map to true north. Tape your paper down

in this position.

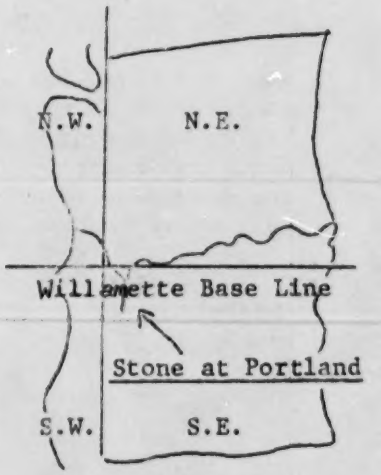
Figure a scale to go by (millimeters), get your first compass reading from your notes, set that bearing on the scratch, lay the compass on your paper, turn the compass until the needle is boxed, and draw your line along this bearing. Make your line as long as it needs to be to show the distance you walked according to your scale. Get your next bearing and set that reading on the scratch, place the compass on the paper at the second point, box the needle, and draw your second line along that bearing. Continue until you arrive back at the beginning point.

The plot map can be made more interesting by drawing in things located on the plot such as streams, trails, large trees, roads, etc.

Basic Elements for Land Surveys in Oregon and Washington

A starting point was needed in Oregon and Washington so a point called the Willamette Stone was positioned near Portland, Oregon.

An east-west line was established from this stone and was called the Willamette Base Line. The north-south line was called the Willamette Meridian. These two lines are the axis of the grid covering the States of Oregon and Washington. Similar starting points and grids are found in other states.



General System for Numbering Townships

In order to further subdivide this area, lines were run at six mile intervals parallel to the meridian and range lines. The lines running east and west were called township lines and were numbered consecutively, north and south of the base line, e.g., Township 1 North (T. 1N) was first row above base line and Township 1 South (T. 1S) was first row below the base line.

The lines running north and south were called range lines and were number consecutively east and west of the base lines, e.g., Range 1 East is first row east of the meridian line and Range 1 West is first row to the west of the meridian line.

	R.3W	R.2W	R.1W	R.1E	R.2E	R.3E
T.3W					2	
T.2N		3				
T.1N						
T.1S			Stone			
T.2S		4				1
T.3S						

The legal description of the township with the (1) in it is (1) T.2S. R.3E W.M. (Willamette Meridian)

What is the description of:

(2)

(3)

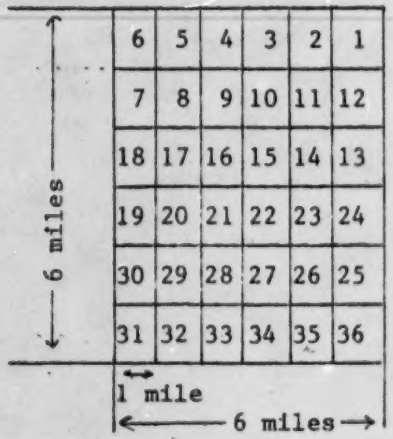
(4)

Numbering Sections in a Township

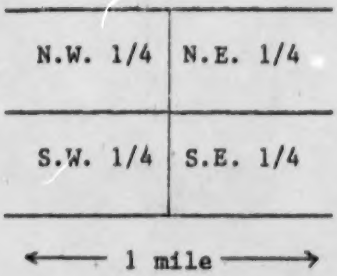
To further divide this gridded land area, each square or township (6 miles on each side) was divided into 36 sections each 1 mile square. Each section contains 640 acres.

Sections are further subdivided as needed for location. One-fourth of a section is 160 acres.

Township



Section Divided Into Quarters



Legal Land Description

Each piece of land has a legal description and can be referred to in order to locate your position or land ownership on the map.

The section and township survey lines on the map have been established on the ground by blazing or marking trees. Trees with carvings in them face the section corners and act as a reference point for location of the section corners. This work was done by surveyors many years ago.

Legend and Scale

Each man has a scale that tells the distance relationship of that map to the ground. (Some maps have scales of 1" - 1 miles, 1/2" - 1 mile, etc.) The legend is very important to help you define the characteristics of the map. Legend shows roads, trails, streams, lookouts, mountain tops, some elevations, etc. (see map)

By using the legal description, the legend and map scale, the map becomes a ready reference to identify points of interest on the ground.

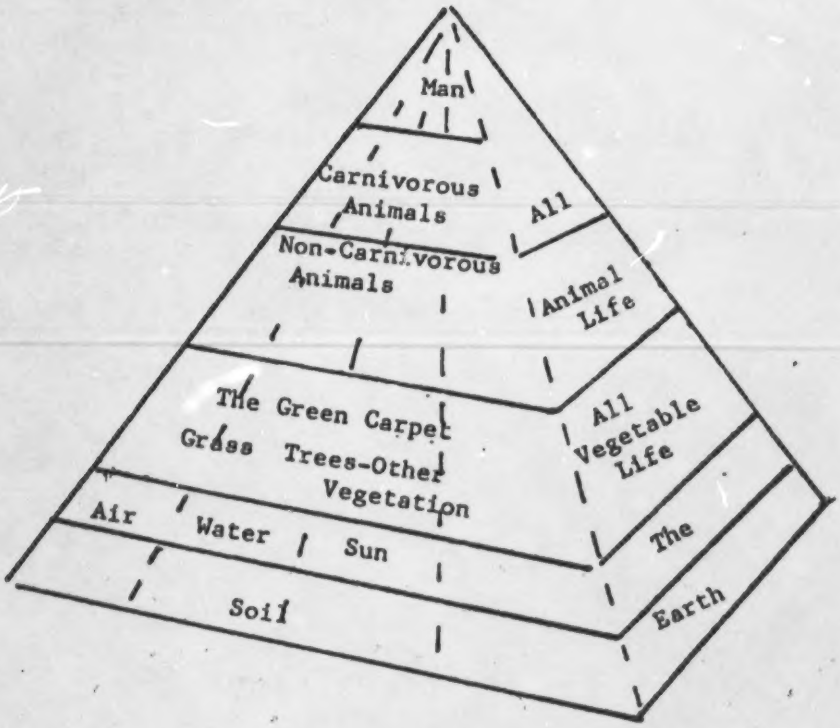
WEATHER

Weather is condition of the atmosphere at any given time. Weather records taken over a period of months and years, makes it possible for a meteorologist, a person who studies weather and climate, to make general climatic statements about the areas he studies. The meteorologist today has instruments of fantastic ability to help him in his study of the weather. Weather forecasts, everyday, save man tremendous amounts of money and also help him to avoid many hardships.

Every camper will have an opportunity to make scientific observations concerning the weather. These observations will not be as serious as those we get through our local radio station from the weather satellites and the radio's other facilities, or from the nightly TV weatherman's reports, but from what you learn as a camper meteorologist, you will better understand the reports that you regularly hear on radio or television.

WEATHER RECORDING INSTRUMENTS AND WHAT THEY TELL YOU

1. Barometer -- Measures air pressure.
2. Thermometer -- Measures temperature of the air
3. Fuel Moisture Sticks -- Measures the amount of dehydration or absorption of water vapor.
4. Psychrometer -- Determines relative humidity of the day.
5. Anemometer -- Measures air speed or pressure of the wind. (Gives the wind velocity).
6. Wind Direction Finder -- Measures wind direction.
7. Rain or Snow Gauge -- Measures amount of precipitation.



Study the above illustration carefully! It tells a great and important story. It tells the story of living things -- ALL living things, even you and I.

At the bottom of the Pyramid of Life, we find the SOIL. The SOIL, together with the AIR, the WATER, and the SUN, makes life possible. There can be no life, such as we know it, without these things!

Life takes two forms, vegetable and animal. The vegetation of the earth (the Green Carpet, as we often call it) is the link between the SOIL and all animal life. Without the SOIL, there can be no Green Carpet. Without BOTH, there can be no animal life!

Man is at the top of the pyramid; the highest member of the animal kingdom, wherein we also find the beasts of the field, the birds of the air, the fishes of the sea, and all the other forms of animal life. Man is at the top of the pyramid; the Keeper as well as the Master of the pyramid. How well he does the keeping will determine how long he remains the Master of the pyramid.

Man is the one form of life that has the power to undermine the pyramid. It is self-evident that Man cannot continue to rip stones out of the foundation without the whole pyramid suffering. If he does, Man's own position at the top will become precarious in the end. Man has the power and the intellect to strengthen or to destroy the pyramid. There are many ways in which Man can strengthen the pyramid, but all of them will be futile unless he begins at the bottom. The Soil Must Be Saved. The pyramid can never be better than its foundation. As the SOIL goes, so goes all life, even you and I!

EARLY HISTORY OF THE EARTH

Long ago, so long in fact that it would be hard for you to imagine how long agc it was, the Earth was a molten mass of very hot materials. Eventually it began to cool, and some of the materials began to take the form of solid rock. Vapors were given off from this mass which formed clouds which, in turn, caused rain. The temperature of the earth became cool enough that all the water did not evaporate, and oceans began to form. Rain and wind both caused erosion of the earth's surfaces above the ocean levels, and carried small bits of the earth to the ocean where these bits became soil, or sediment, on the ocean bottom.

Little plants and animals began to appear, and gradually produced more and more complex forms of life. If a type of plant or animal was successful in living in its environment, it continued on, and perhaps from it developed other forms of plants or animals similar to it. Those plants or animals that found their environment too harsh slowly disappeared. Sometimes environments changed, as temperature, or moisture conditions changed over many thousands of years.

THE GEOLOGY OF OREGON

The history of the rocks in Oregon dates back more than 400 million years. However, most of the surface dates back only about one million years. At about this time, the climate of Oregon became much colder. At about the same time, a series of large volcanic cones erupted, resulting in the formation of Mount Hood, Mount Jefferson, and Mount Mazama (which erupted and collapsed later, leaving Crater Lake in its place). The results of the uplift of the Cascade Range along this area of volcanic activity were many. For one thing, the rivers could no longer flow from eastern Oregon directly to the Ocean, but were diverted north into the Columbia River first. The presence of the mountains also meant that eastern Oregon, now cut off from the moist winds from the ocean, became cold and dry, in contrast to the warmer, humid regions west of the mountains.

THE FORMATION OF SUTTLE LAKE AND BLUE LAKE

As glaciers moved down off the sloped of the Cascades in ages past, they changed the land by carving and gouging out areas and piling materials in other placed.

The story of Suttle Lake is closely connected with the geologic story of Mount Washington. The Lake was formed by one of six major glaciers that came down off ancient Mount Washington. One of these glaciers scooped out the Suttle Lake basin. The east end of Suttle Lake is dammed by moraines (earth materials left by glaciers) which blocked most of the drainage to form the lake.

Blue Lake also is blocked by a moraine at its east end. In contrast to Suttle Lake, however, it may be a water-filled volcanic crater, since it is as much as some 294 feet deep.

A STUDY OF SOIL

GENERAL INFORMATION

The study of soil formation begins with solid rock. For thousands, and often, millions of years, solid rock has been broken into smaller pieces by many kinds of processes. The freezing and thawing of water; pressure from growing roots; moving ice, water, and wind; and chemical reactions with the rock minerals all help to break up the rocks. Through the ages, these and other processes have formed the few inches of topsoil which support life.

Soils are formed from the bedrock and parent materials. We can tell about a soil and what it is like if we know something of the rocks it came from. Rocks are in these three classes according to how they are formed.

Igneous Rocks: These are rocks which have cooled from molten masses, both from within the earth's crust and upon the surface. Many of these rocks came from volcanoes. Pumice, Obsidian granite, tuff and basalt are examples of igneous rocks.

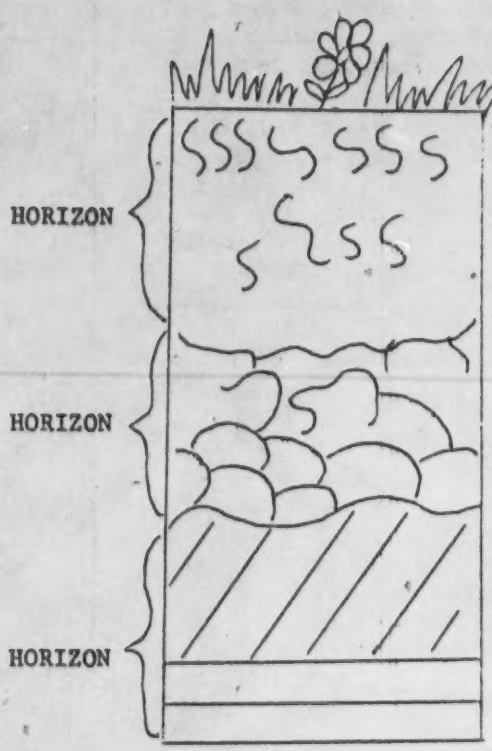
Sedimentary Rocks: Some rocks are formed by deposited sediments from mud, chemical or organic residues. These deposits, when compressed into hard layers are call sedimentary rocks. Shale, sandstone, and conglomerate are examples of sedimentary rocks.

Metamorphic Rocks: Some rocks are derived from other existing rocks. When rocks are affected by heat, pressure, or water to cause changes in their minerals or texture, they become new rocks. Examples of metamorphic rocks are: shale changed into slate; sandstone into quartzite; limestone into marble; conglomerate into schist; and soft coal into hard coal.

The darker topsoil is built up gradually from the subsoil below it by the addition of humus from decaying plants and animals. The subsoil layers, or horizons, are usually lighter colored and contain less decayed plant materials. They are more compact and clayey and air and water may not penetrate them as rapidly. Therefore, lowest subsoil and the solid rock is a horizon of parent material that is mostly raw rock fragments and minerals that are poor for plant use.

Each soil has a profile or cross section that is made up of several layers called horizons. These horizons differ in depth, color, feel and chemical composition. The next page shows soil profiles and what they might look like.

GENERALIZED SOIL PROFILE



DUFF	-Decaying materials on top of soil
SURFACE	-Dark Gray colored-high organic matter, high biotic activity, abundant roots, commonly leached.
SUB-SURFACE	-Moderately dark, many roots, moderate biotic activity, moderate organic matter, commonly leached.
SUB-SOIL	-Below plow depth-brown or reddish colored, more clay than surface, fewer roots.
LOWER SUBSOIL	-More yellowish and less clay, fewer roots than subsoil, less aeration than above.
PARENT MATERIAL	-Not solid rock, slightly weathered rocky or sandy mass from which soil develops. No biotic activity, few roots.
BEDROCK	-Solid rock.

Things to look for in soil:

1. COLOR --tells about organic matter, drainage, biotic activity, fertility.
2. TEXTURE --the feel - sandy, loamy clayey--tells water holding capacity, tilth workability.
3. STRUCTURE--the shape--block, platy, granular--tells drainage, permeability, aeration.

STUDY OF LIVING SOIL

1. Field Study

Stake out a square foot area of ground on your field study plot and carefully inspect all of the soil in this area to a depth of 3 inches. Record all of the evidence of plants and animals you can observe.

NAME OF ANIMAL	NUMBER	NAME OF PLANT	NUMBER

2. Conclusions:

a. What causes odors in topsoil? _____

_____

b. What benefits do animals and fungi have to the soil?

_____

c. How do the rotting leaves help living plants? _____

_____

VOCABULARY LIST

Soil - Earth

humus

profile

horizon

sedimentary

metamorphic

igneous

lava

erosion

fertile

organiz

obsidian

pH

moraine

leached

glacier

clay

Study the information recorded on your soil profile. Think about the observations you have made. Write a paragraph about the soil found on your plot. Mention the types of plants that seem to grow best in this soil.

A STUDY OF WATER

Water is our most valuable renewable resource. All life is dependent upon water for survival. Water is needed by man for industry, irrigation, recreation, etc. The freezing and thawing of water helps break rocks into smaller particles that eventually become soil. Water helps leach nutrients down into the soil so plant roots can use them. Water in the soil is used by plants to manufacture food. Wildlife needs water in order to live.

Water renews itself through the water cycle. The elements that make up the weather (heat, pressure, wind and moisture) cause precipitation, evaporation, and condensation in an endless cycle.

Because of heat, water in lakes and the ocean evaporates and rises into the atmosphere. Here it cools and condenses, forming clouds which are blown by the wind. When the clouds contain too much moisture, it starts to rain. As the rain falls to the ground, some of it sinks into the ground as gravitational water, maintaining the earth's underground water supply. It may form a thin film around each soil particle as hygroscopic water. Or, it may be taken up through the roots of trees and plants as capillary water, supplying them with food and minerals from the soil.

The water that does not soak into the ground runs off into streams, lakes and into the ocean where some of it evaporates and returns to the air to form clouds again. Thus, the cycle repeats itself.

VOCABULARY LIST

Water

aquatic

watershed

water cycle

hygroscopic

gravitational

capillary

evaporation

condensation

precipitation

transpiration

pollution

purification

irrigation

reservoir

water table

Briefly describe the most important water sources found at camp.

_____

_____

_____

Briefly discuss the major uses of water sources found at camp.

_____

_____

_____

_____

RESOURCE RELATIONSHIPS

The forest is a dynamic living ever-changing community of plants and animals dependent upon each other and the other natural resources for survival. Nothing stands still in the forest. Plants and animals are born, grow and die to enrich and change the soil.

Organic material thus added, affects the ability of the soil to absorb and hold water that is needed by the plants and animals. As the structure of the soil is changed by decomposing plants and animals new types of plants are able to grow. This in turn determines the kind and amount of animals that can live in an area.

Man has used and converted the natural resources of the forest to benefit his life. He has done things that have been detrimental to the forest and to himself. He has also done other things that have been beneficial.

If man is to survive on earth, he must learn to live in harmony with the natural resources because he is totally dependent upon them. Past civilizations flouished when they had plenty of natural resources but vanished when the supply of resources dwindled.

The first step in learning how to live with our resources is to understand some of the ways that each natural resource affects the other resources. Shown in chart form are some of the ways that resources affect each other.

HOW RESOURCES AFFECT EACH OTHER

	WATER	PLANTS	WILDLIFE	MAN
SOIL	Affects: Runoff; Percolation into ground; Underground storage; Purity by filtration	Anchors Plants; Supplies water & minerals; Affects where plants grow by: Topography, elevation, soil depth, acid or alkalinity of soil.	Affects where animals live because of topography, elevation, availability of water and types of plants which grow.	Affects: Productivity of soil, where man lives, what he produces; Economy based on location of resources. Scenic values.
	SOIL	PLANTS	WILDLIFE	MAN
WATER	Washes away soil; Affects types of soil (swamp, desert); helps break down soil by freezing, flowing, and seepage.	Affects: Transpiration; where plants grow--swamp, hillside, rainfall, fog, snow, etc.	Affects: Aquatic animals; where animals live by their need for water and food.	Provides scenic values, recreation; Affects where man lives (floods, drought), what grows on soil.
	SOIL	WATER	WILDLIFE	MAN
PLANTS	Helps rocks break into soil by root penetration. Make organic fertilizer which enriches soils and absorbs water. Holds soil in place. Protect soil from rainfall.	Make open spaces in soil for water penetration, tap roots. Shade streams-keep water cool. Use water in transpiration; purify water.	Provide food, shelter; water in succulent plants for drinking; give off O_2 for breathing.	Provide: Forage for cattle; shelter; necessities & luxuries of life. Recreation, shade, scenic value.
	SOIL	WATER	PLANTS	MAN
WILDLIFE	Make organic fertilizer; cause soil compaction; build beaver dams--percolate & hold H_2O in soil; prevent soil erosion.	Pollute water; build beaver dams--flood control; water storage.	Fertilize plants; carry seeds; give off CO_2 that plants need, destroy plants.	Provide scenic values; recreation, hunting, fishing, livelihood in trapping; damage crops; kill livestock.
	SOIL	WATER	PLANTS	
MAN	Increases & decreases soil productivity; causes soil erosion; puts new lands in production.; changes face of earth.	Stores water in dams; Po-lutes water; diverts water; uses more water than available in some areas; manages for his benefit	Grows new crops; eliminates natural plants; clears land of plants; harvests trees & grass; manages plants for his benefit.	Harvests wildlife and natural predators; Upsets nature's cycle of animals; manages for his benefit.

FOREST INFLUENCES

Many things change the forest. Some people call these things "enemies of the forest". They are really influences that harm some natural resources and help others. What might be an enemy to trees could be food for animals. These influences sometimes interfere with man using the forest.

FIRE is the most spectacular destroyer of forests. Fires burn or scorch everything in reach. Trees can burn all the litter and humus on the ground so the soil cannot hold as much soil moisture; it reduces soil nutrients that plants need to grow. If the plant cover is burned, soil erosion can occur easier; there is no food for wildlife, or livestock. Burned soil and plant ash pollute streams, suffocate fish, and kill wildlife. Fire kills young and old trees alike. Fires weaken old trees and make it easier for insects and disease to attack trees. Some fires are caused by natural causes such as lightening; but 9 out of 10 fires are still caused by man's carelessness and ignorance. Cigarettes, campfires and matches cause most fires. Some people set fires on purpose. They think this improves hunting or forage for grazing. Some set fires because of a grudge or they need a job -- these people are wrong!

Foresters can use fire as a tool to make trees grow better in some forest. If used properly, fire can help the forest.

Uncontrolled fires, however, mean loss to the landowner, the recreationist and to everyone who uses products made from our natural resources.

Each year the U.S. Forest Service spends about 15 million dollars to control fires. At least 55 million dollars are spent, by everyone, each year to control wildfire. Think how useful that money could be elsewhere if man were not so careless.

INSECTS are the silent killers of trees. Each year more timber is killed by insects than by fire. Much of the timber killed by insects can be salvaged and made into wood products.

The bark beetles are the deadliest enemies of trees. The Western pine beetle, Douglas-fir beetle, Engelmann spruce beetle, and Southern pine beetles kill huge amounts of timber. The bark beetles dig tunnels and lay eggs under the bark of the tree, cutting off the trees food supply between the leaves and roots. If the tunnels circle the tree trunk, the tree will die.

The defoliator insects, such as the spruce budworm, eats the needles or leaves of the trees so the trees cannot manufacture food.

Some insects stunt and deform trees; others bore into the wood and reduce the quality of wood.

Insects are always present in the forest and provide food for many animals. But if insects increase rapidly they must be controlled. Foresters remove infested trees, or spray with insecticides so as not to harm wildlife or contaminate streams.

Sometimes birds, other insects or insect parasites can be used to control harmful insects.

DISEASES are the hidden enemies of trees. Fungi attack trees in many ways. Some enter through a wound in the tree; others enter in the roots. Old, weak trees are easier for a fungus spore to grow in than a young healthy tree. Fungus are called "conks" and many are shelf-like brackets on the tree (see drawing). Fungus reduces the growth rate of trees, and reduces the wood in the trunk to a rotten mass; some may kill trees. Some fungus grow only on living trees and are harmful; some grow on dead trees and are beneficial because they help decay the wood and return it to the soil faster.

Chestnut blight is one of the many blight diseases in the forest. It is a parasitic fungus from Asia. It spread rapidly and killed almost all of the valuable Eastern chestnut trees.

The white pine blister rust is one of the many rust diseases in the forest. This rust needs two plants to survive (the white pine and wild currant and gooseberry plants.) In order to eradicate this rust, the currant and gooseberry plants are dug out of the ground. This breaks the cycle and the rust dies, leaving the white pine tree to live.

Chestnut and White pine trees that are resistant to these blights are being developed to reforest these areas. Foresters are studying other trees and diseases to develop trees resistant to these diseases and rusts.

Fungus and blights spread by producing tiny spores, like seeds, that float through the air and land on other trees. If trees can be harvested before they are old in age, the fungus damage will be kept to a minimum.

WEATHER can be harmful. Snow and ice can break limbs and tree tops, opening wounds for insects and diseases to enter. Winds can blow down trees when the soil becomes soaked with rain water. Wind blew over 17 billion board feet of timber in Oregon, Washington, and California in 1962. This caused soil erosion, insect and disease attacks, water pollution, fire hazard, loss of roads, bridges, campgrounds, houses, orchards and human lives. A freak windstorm in the summer of 1971, blew down an additional 110 million board feet in the Big Summit, Snow Mountain and Paulina Districts of Oregon.

LIVESTOCK AND WILDLIFE grazing in some forests can compact soil, destroy young trees and damage mature trees. When there is more wildlife than there is food supply, the wildlife will eat the trees we need for other uses. Bears strip bark off trees, porcupines eat tops out of trees and deform them, deer rub antlers on young trees killing them, elk eat bark off trees in winter. Other animals can damage trees too.

MAN causes much damage to forests. He is careless with fire, thoughtless when he hacks trees, leaves garbage and papers along streams or in campsites. He causes much vandalism by stealing signs, pulling shingles off of shelters, writing or carving names on trees and shelters. Sometimes he doesn't think about the things he does and is careless when he hunts or camps.

Most people take care of the forest but a few spoil it for everyone.

It costs money to correct and repair the careless acts of man.

In order for man to manage the forests for his benefit, he must keep the forest as healthy as possible.

HOW OLD IS THAT TREE?

All trees make some growth each year. Some grow very rapidly, some very slowly. The annual growth is made not only in height, but also in diameter.

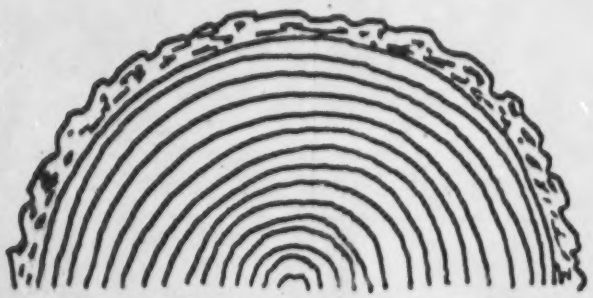
He can count the growth rings on a stump of a tree to tell how old that tree was when it was cut. Many times foresters want to know how old standing trees are, how fast they are growing or to tell if they are rotten inside.

Here are three ways to tell the age of trees or tree stumps:

1. How old was this tree when it was cut?

The current year's growth is the ring next to the cambium layer just inside the bark. The rapid spring growth is lighter colored than the growth made in the summer, so a light and dark colored ring makes one year's growth. It is easier to see and count the summer wood or dark rings to determine the age of the stump or a log of a tree when it was cut.

These rings are easily counted on the stumps of cut trees.



How old was this tree when it was cut?_____. The dark rings are summer wood and the light rings are spring wood. One light and one dark ring makes one year's growth.

Find a tree stump in the forest and answer the following questions.

Problems:

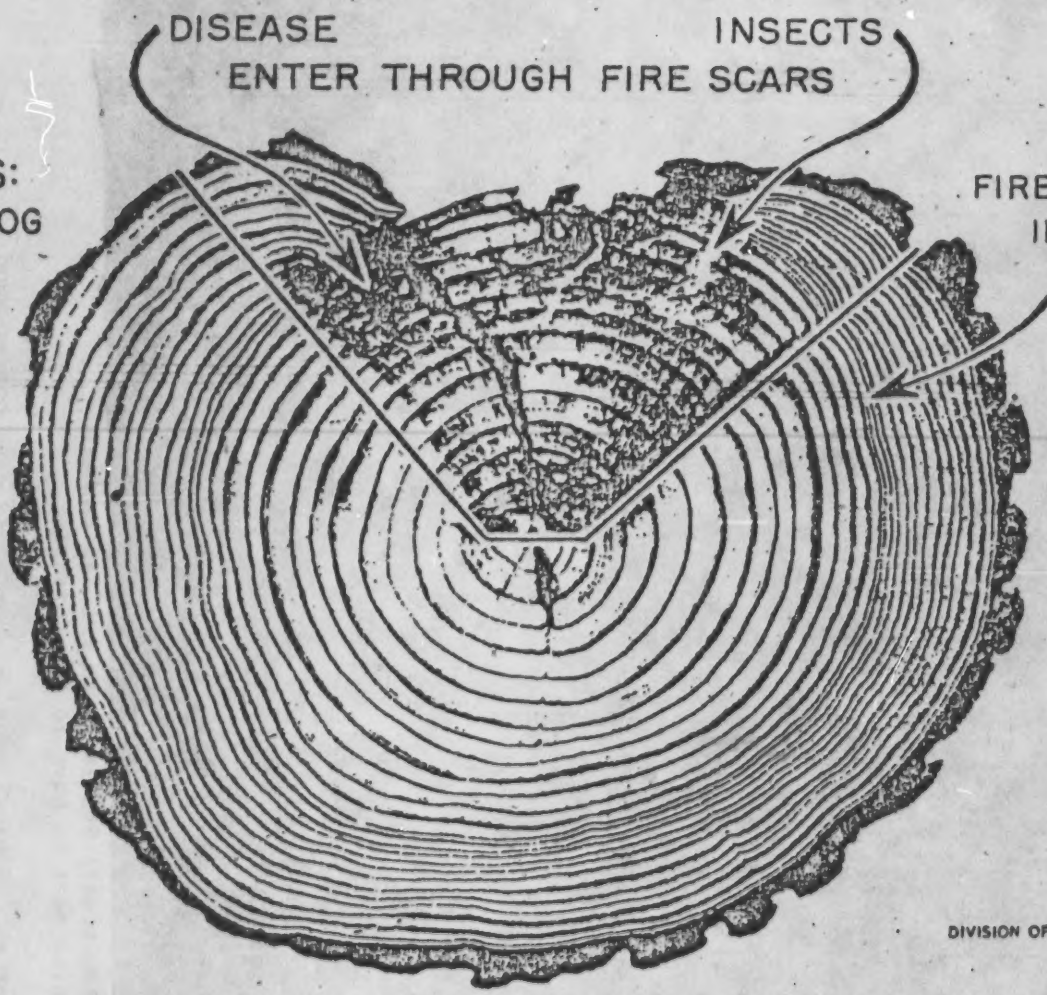
Was this tree growing fast when it was cut? _____

How old was it? _____

What was the diameter of the tree when cut? _____

How tall was it? You can compare the size with live trees near or find the top of that tree that was left in the woods and measure the distance from the stump to the top. _____

HOW FIRE RUINS TIMBER



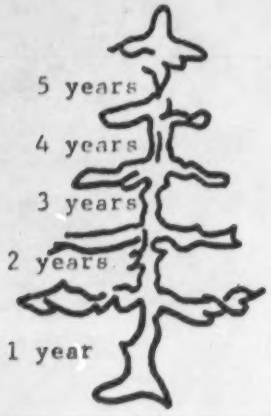
U. S. FOREST SERVICE
DIVISION OF COOPERATIVE FOREST MANAGEMENT
1950

THE RESULT OF ONE FIRE

Wood destroying rot and insects entered through the fire scar. The defect in the tree is permanent. The more intense fires also kill some trees outright, and slow down the growth of others by killing part of the green foliage.

2. How old are young trees?

Live trees always have a cluster of buds at the top of the tree. As growth begins, the center bud sends up vertical growth and the buds around the center bud send out a series of horizontal branches. This is repeated each year. The age of young conifer trees can be determined by counting the number of sets of whorls of these annual horizontal branches. Thus, if we count 25 whorls of these branches, the age of the tree is about 25 years old. As the tree gets older, it is diffuclt to count the whorls.



Young conifer tree

PROBLEMS:

If there are young conifer trees growing in an area that was logged, can you tell how long ago it was logged?

The farther apart the branches are on the trees, the faster the trees are growing. Study young trees in different areas and compare growth rates.

3. How old are large standing trees?

The most accurate method of determining the age of older trees is to use an increment borer. This instrument is a hollow wood-boring bit that cuts a core instead of shavings, as with a regular wood-boring bit. These borers are expensive. To determine the age of the tree, the borer is bored into the center of the tree at d.b.h.*, the core is removed from the hollow stem of the borer and the growth rings from the cambium layer to the center of the tree, as shown in the core, are counted to derermine the age of that tree. Care must be used to not chip the sharp bit of the borer. It must be cleaned and oiled every day so it doesn't rust.

Problems:

Did the tree grow faster when it was young or older?

How old is the tree? Should it be cut for lumber? What other uses does it have in the forest?

Did the borer go in easy? Why do some trees have harder wood than others? What are hardwoods and softwoods?

How can you tell when you have bored to the center of the tree?

Practice with these tree tools until you can become proficient in their use.

* diameter breast height

THE INCREMENT BORER

The most accurate method of determining the age or growth rate of trees is to use an increment borer. This instrument is a hollow wood-boring bit that cuts a core instead of shavings, as with a regular wood-boring bit. The increment borer has three parts. See diagram #1.

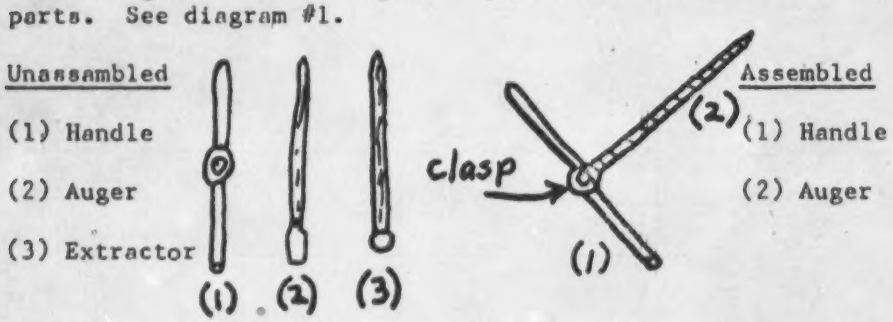


diagram #1

ASSEMBLING THE BORER

Unscrew the cap of the borer and pull out the extractor. Put the extractor in a safe place so no one will step on it. Tip the handle up and let the auger slide out into the palm of your hand. Be careful not to let the auger fall to the ground because it may chip.

Assemble the borer by inserting the square end of the auger into the square hold of the handle. Close the clasp so the auger won't come out.

BORING A TREE

1. Hold the borer firmly against the tree at d.b.h. which is 4½ ft. above the ground. All trees are bored and the diameter measured at d.b.h. or diameter breast height. (Note: If you want to reach the center of the tree, be sure to select a tree whose radius is much smaller than the borer.)

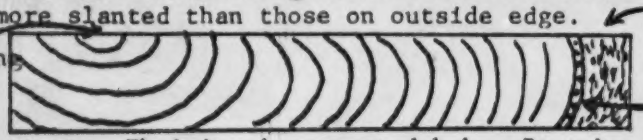
2. Point the auger toward the center of the tree and turn the handle until the bit of the auger starts to bore into the tree.

3. After several turns, stand back from the borer and see if it is going toward the center of the tree. Correct its course before it bites too deeply in to the wood.

4. Continue boring until you think you have reached the center of the tree.

DETERMINING THE AGE

One springwood ring and one summerwood ring together makes one year's growth. Count the summerwood or dark rings to determine age of tree. Growth rings closer to the center of the tree are more slanted than those on outside edge.



(DIAGRAM #4)

(Important: The ring is age at d.b.h. It takes several years for a tree to reach d.b.h. Add the following years to ring count for total tree age: Douglas-fir 8, pine 11, hemlock 7, spruce 7, true-firs 8, cedar 7, alder 2.)

CARE OF THE BORER

Increment borers cost $30 to $40. They must be used carefully. Here are a few suggestions to follow in the use of the borer.

1. Don't bore into knots or gnarled trees. The auger bit may chip.

2. Don't force the extractor into the borer. Forcing it may compress the wood core, making it difficult to clean and may break the extractor. (If wood is jammed in the auger, take it to an engineeing repair shop to have it removed.)

3. Don't poke any objects down the cutting end of the auger; it may chip the bit.

4. Don't bang the borer on rocks or wood.

5. If the bit is dull, chipped, or the extractor becomes broken, take it to an engineering repair shop to be sharpened or repaired.

INSTRUCTIONS FOR CLEANING

Be sure to clean and oil the borer after each use. Make a cleaning kit of: small can of penetrating oil; two small rags on pieces of thin wire, one for cleaning, one for drying; pad of steel wool; large, clean rag for wiping auger and extractor.

1. Rub down the auger and extractor with steel wool and penetrating oil. Wipe with clean cloth.

2. Pull a small piece of cloth saturated with penetrating oil on a wire or string through the barrel of the auger.

3. Dry the inside by pulling a small dry piece of cloth through the borer. Wipe the whole borer dry.

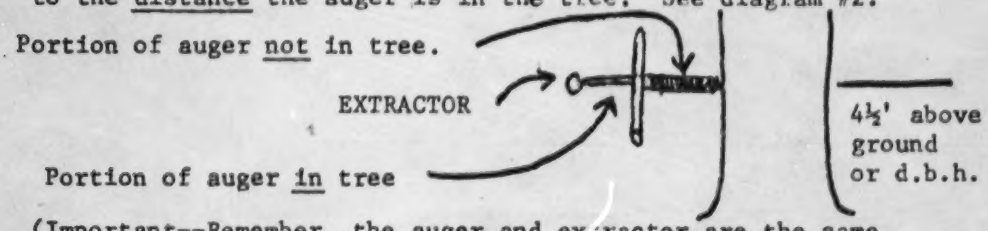
4. Soak in gasoline overnight if the borer is sticky with pitch or grease.

CHECKING HOW FAR TO BORE

Assume the tree trunk is round. The auger and the extractor are the same length.

1. Lay the extractor alongside the auger. The tip of the extractor should touch the bark.

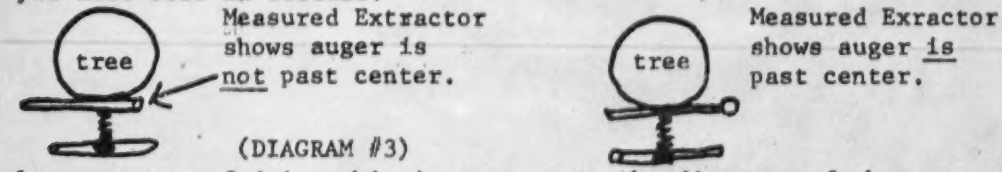
2. Grasp the extractor where it crosses the handle. The part of the extractor extending past the handle is <u>equal</u> to the <u>distance</u> the auger is in the tree. See diagram #2.



(<u>Important</u>--<u>Remember,</u> the auger and extractor are the same length.)

3. Still holding the extractor at the place where it crossed the handle, place it against the tree, parallel to the handle, with your hand on the auger.

   If the part between your hand and the head of the extractor extends past the edge of the tree, you are probably past the center. If it does not extend past the edge of the tree, you must bore in further.



(DIAGRAM #3)

An alternate way of doing this is to measure the diameter of the tree with a diameter tape and mark 1/2 the diameter on the auger with a grease pencil. Bore into the tree to the grease pencil mark.

EXTRACTING THE CORE

Once you have reached the center of the tree, you are ready to extract the core.

1. Insert the extractor into the hold of the auger. As you push it in, lift the end of the extractor gently so it will go under the core easily. Push it all the way in.

2. Unscrew the whole borer one full turn.

3. Pull the extractor out of the auger in a straight line.

4. Remove borer from tree.

PROJECTS WITH AN INCREMENT BORER

1. Determine age of trees.

2. Determine growth variations due to competition for light, soil, moisture and minerals with other plants, weather cycles, etc.

3. Determine if trees are sound or are diseased inside.

4. Determine difference in textures between woods, e.g., softwoods, hardwoods.

5. Determine if soil is good for growing trees. This is called "determination of site index for tree growth". (Site determination is based on the relationship of the height and age of the dominant trees in the forest. The dominant trees are the tallest trees in the stand.) The site for different growing trees is expressed from 1 to 5 and is different for different tree species.

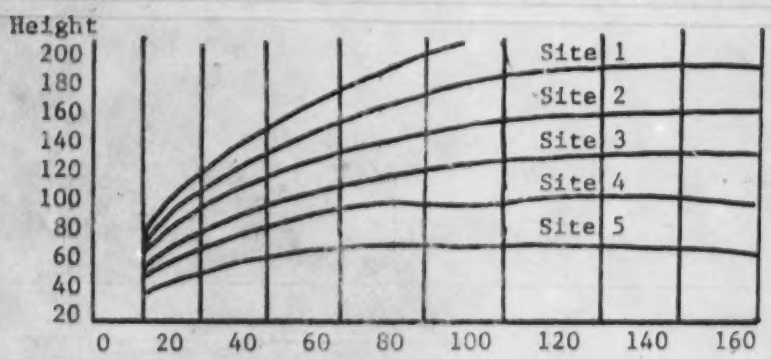
Site Index	Classification
1	Excellent for tree growth
2	Very good for tree growth
3	Average for tree growth
4	Below average for tree growth
5	Poor for tree growth

Locate a dominant tree. Measure total height in feet and determine total age by using the increment borer. (Use Plant Air #6, "Tree Tools", to determine height of tree.) Fill in information for trees you measure, and using site index table below determine site index of soil for growing tree.

Tree Species_____, Ht.____ft., Age___yrs., Site_____, Classification_____

Tree Species_____, Ht.____ft., Age___yrs., Site_____, Classification_____

Tree Species_____, Ht.____ft., Age___yrs., Site_____, Classification_____



Site Index Table

PLANT WORDS

In order to better understand our plant resource and its management, a person must know the technical words used. Listed below are some of the common words that you should know:

Annual Ring - The growth layer of 1 year, as viewed on cross section of a stem, branch or root. (Made up of one light-colored ring of spring growth and one dark-colored ring of summer growth.)

Board Foot - A unit of measurement represented by a board 1-foot long, 1-foot wide and 1-inch thick. In measuring trees the working unit is 1,000 bd. ft.

Browse - Any shrub or tree eaten by domestic or wild animals for food (usually refers to wild animals).

Cambium - The growth layer of cells between the bark and the stem of the tree. The cambium cells divide, causing the tree to grow in diameter.

Clearcutting - A method of harvesting certain tree species in which all trees in a delineated area are cut, such as Douglas-fir and Western hemlock.

Climax-plant Community - The final stage of plant succession which continues to occupy an area indifinitely, as long as climatic and soil conditions remain the same.

Conifer - A tree belonging to the order Coniferae usually evergreen with cones and needle-shaped leaves, and producing wood known commerically as "soft wood".

Cord - A unit of measurement of stacked wood. Standard, a pile of stacked wood contains 120 cubic ft. within its outside surfaces. The standard dimensions are 4 by 4 by 8 feet. 2½ cords - 1,000 bd. ft.

Duff - Forest litter and other organic debris in various stages of decomposition, on top of mineral soil.

Forage - In range management, unharvested plants available for animals to use. When it is cut it becomes feed.

Forestry - The scientific management of forests for the continuous production of goods and services.

Grazing - The eating of any kind of standing vegetation by domestic livestock or wild animals.

Hardwood - Generally, one of botanical group of trees that have broad leaves, in contrast to the confiers: also wood produced by such trees regardless of texture.

Humus - The plant and animal residues of the soil, litter (duff) excluded, which are undergoing decomposition.

Increment - Increase in diameter, basal area, height, volume, quality or value of individual trees or stands in relation to time.

Intolerance - The incapacity of a plant to develop and grow in the shade and in competition with other plants, such as Douglas-fir and ponderosa pine.

Plant succession - The progressive development of a plant community by replacing one plant community with another toward the highest ecological expression or climax.

Pruning - The removal of live or dead branches from standing trees. This may be done artificially or naturally. Natural pruning is the result of deficiency of light, decay, snow, ice, ect.

Range plant - Any herbaceous or shrubby plant growing on rangeland, including forest land. Range plants are divided into four groups: Grasses, grasslike plants, weeds and browse.

Reforestation - The natural or artificial restocking of an area with forest trees.

Second-growth forest - A forest area in which the virgin growth has been removed and a new growth of trees is being managed by man.

Selective cut - Removal of individual trees from a stand of timber. Harvest of individual or small groups of trees over period of years insures maintaining an uneven-age stand such as ponderosa pine.

Slash - Branches , bark, tops, chunks, cull logs, uprooted stumps, and broken or uprooted trees left on the ground after logging.

Sustained Yield - Continuous production at a more or less uniform annual rate based on the yield of the timber stand or range.

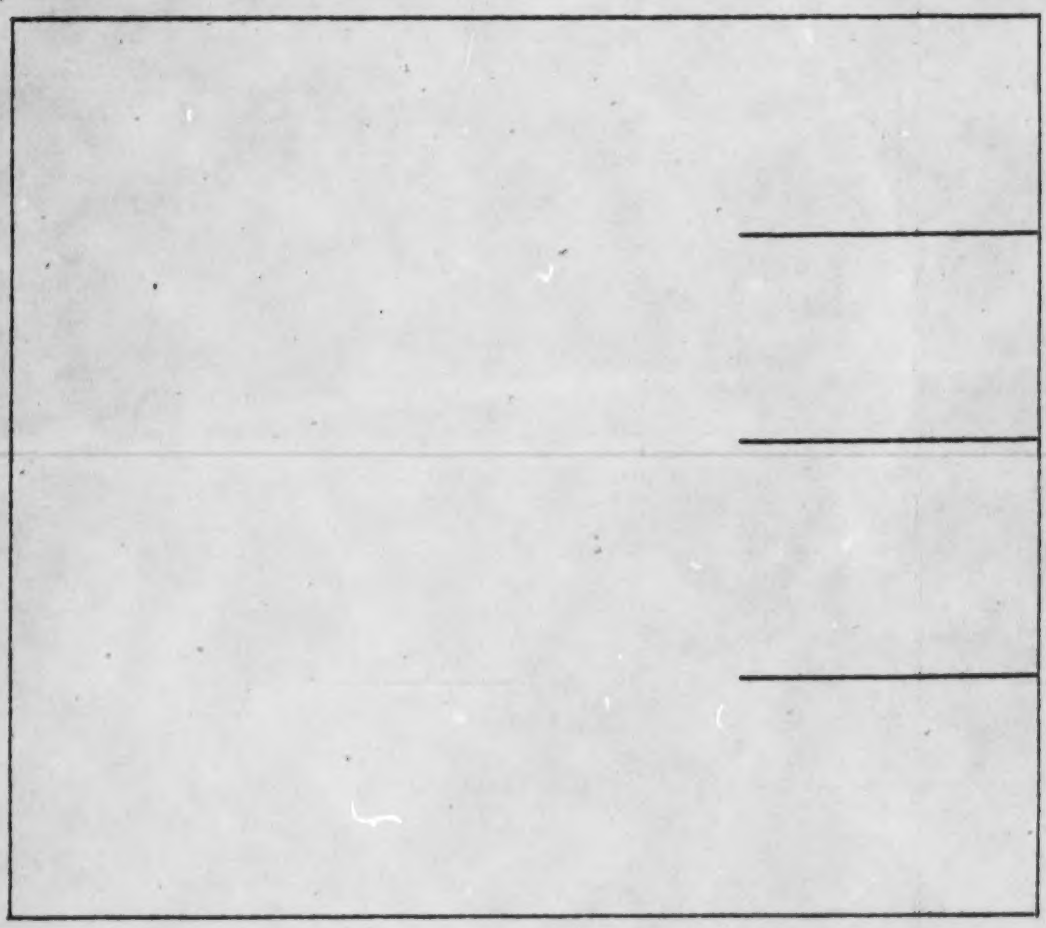
Thinning - Cutting in an immature stand to increase its rate of growth, to foster quality growth, to improve composition, to promote sanitation, to aid in better cover and to use material that would be lost otherwise.

Tolerance - The ability of a plant to develop and grow in the shade and in competition with other plants, such as western hemlock, western red cedar and white fir.

Transpiration - The process by which water vapor leaves the foliage or other parts of a living plant and is released to the atmosphere.

Virgin forest - A mature or overmature forest growth essentially uninfluenced by human activities.

THIS IS MY ADOPTED TREE

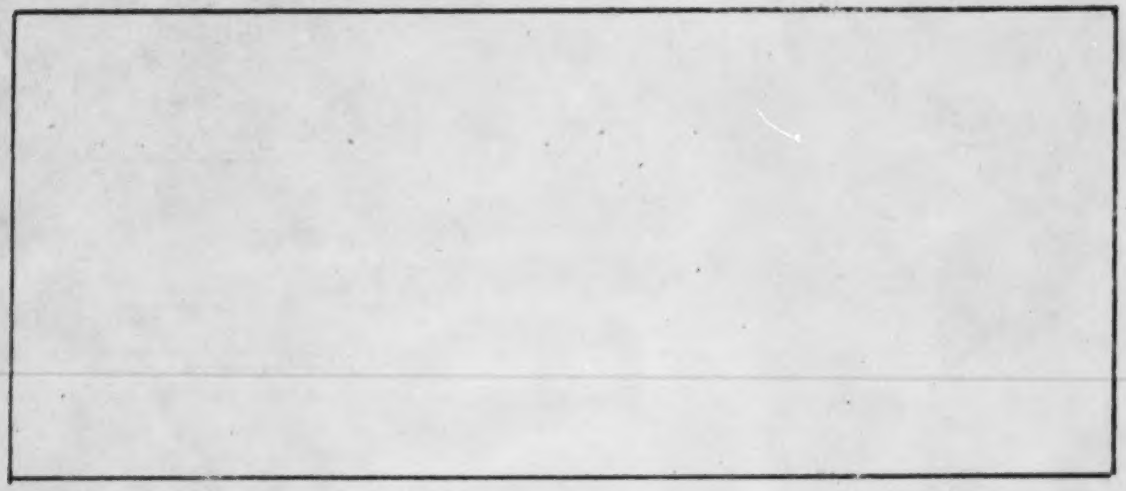


THE NAME OF MY TREE IS _____

THE NAME OF MY STATE TREE IS _____

SOME TREES LOSE THEIR LEAVES IN THE FALL AND WINTER.
THESE TREES ARE CALLED D E C I D U O U S TREES.

HERE IS A PICTURE OF A DECIDUOUS TREE.



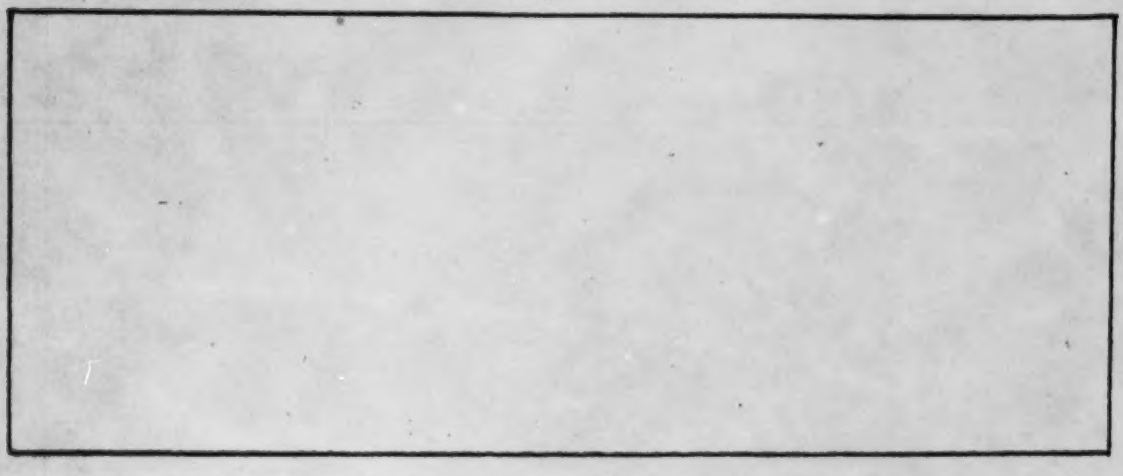
SOME TREES KEEP THEIR LEAVES ALL YEAR.
THESE TREES ARE CALLED E V E R G R E E N TREES.

HERE IS A PICTURE OF AN EVERGREEN TREE.

MY ADOPTED TREES IS (A, AN,) _____ TREE.
DECIDUOUS EVERGREEN

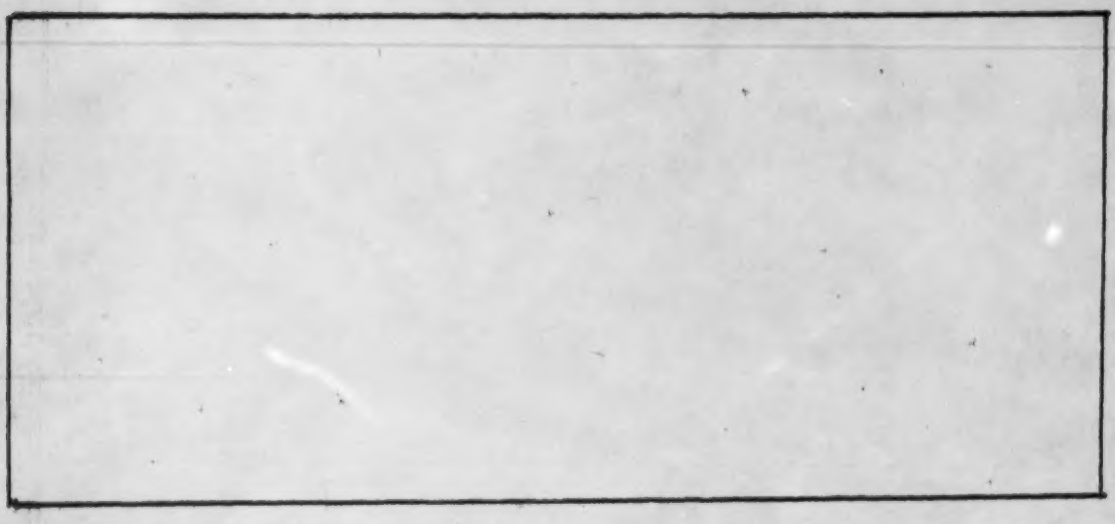
SOME TREES HAVE FLAT LEAVES.
THESE TREES ARE CALLED B R O A D L E A F TREES.

HERE IS A PICTURE OF A LEAF FROM A BROADLEAF TREE.



SOME TREES HAVE NEEDLE-LIKE LEAVES.
THESE TREES ARE CALLED C O N I F E R S .

HERE IS A PICTURE OF LEAF FROM A CONIFER.



MY ADOPTED TREE IS A _____ TREE.

BROADLEAF CONIFER

MY TREE

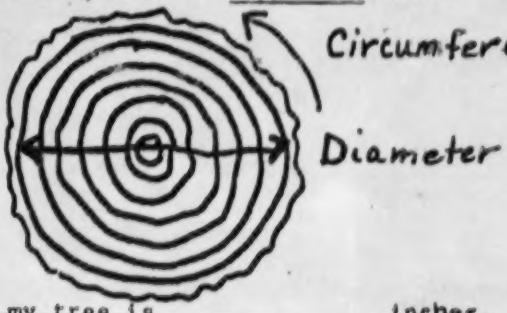
1. The age of my tree is _____ years. (My guess)

2. The real age of my tree is _____ years. (using increment borer)

   My tree grew fastest when it was _____ years old.

3. The distance around my tree is _____ inches. (My guess)

   The real distance around my tree is _____ inches. (using tape)



4. The distance through my tree is _____ inches. (My guess)

   The real distance through my tree is _____ inches. (Using tape)

   The distance around (called circumference) is about 3 times more than the distance through. (called diameter.)

   circumference ÷ 3 = approximate diameter

5. The height of my tree is _____ feet. (My guess)

   The real height of my tree is _____ feet. (Using stick)

6. List some things that might harm this tree.

_____

_____

_____

_____

7. How does this tree help?

Soil _____

Other plants _____

Water _____

Wildlife _____

8. Here are some ways I can enjoy this tree:

_____

_____

_____

_____

_____

EVERY TREE HAS THREE PARTS.....Each part helps the tree grow and stay healthy.

CROWN

The top, or crown, grows up from the ends of the branches. The leaves in the crown make food from sunlight and water.

TRUNK

The stem, or trunk, grows wider each year. The trunk holds the tree upright, and lets water go from the roots to the leaves. The bark protects the tree from injury.

ROOTS:

The roots grow down into the soil. The roots keep the tree in place. The roots get water and minerals from the soil.

A TREE GROWS A NEW RING OF WOOD EACH YEAR.

you can tell how old a tree is by counting the growth rings.

How old was this tree when it was cut?

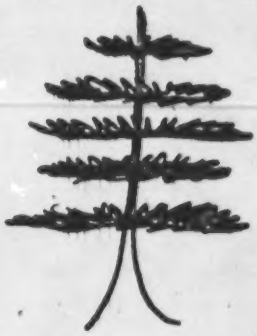
_____yrs.

What else can the growth rings tell you about the tree?

_____

_____

You can tell how old a young conifer tree is by counting the rows of branches. How old is this conifer?



_____yrs.

What else can the rows of branches tell us about the tree?

_____

_____

Something fun to do:

Find a tree stump in the woods and count the growth rings.

How old was it when it was cut? _____yrs.

Find a young conifer in the woods and count the rows of branches.

How old is it? _____yrs.

40wC

STUDY OF A ROTTEN LOG

Would you believe . . . . . .

that plants can live on and in wood??
that a rotten log is really alive??

All plants are born, grow to maturity, and die. They live in communities with many other plants in always changing environments.

With your class, go to a rotten log (or stump) and find out all you can about it. Take care not to tear it apart so others can enjoy it, and so the living things in and on the log will survive.

How did this log (stump) get here? _____

_____

Where is the stump (or log) of the tree? _____

_____

What kind of tree was the log when living? (Look at bark and wood structures)

_____

How did the tree die? (Notice stumps of other trees in area) _____

_____

When did the tree die? (Determine age of standing tree in area) _____

_____

How old was it when it died? (Count the rings on stump if possible)

_____

Record evidence of plants living on or in log: (lichen; mosses; fungi; broadleaf and conifer)

Name	Location (top, side, inside, under)	Seed Source	Effect on Log	Benefit to Forest Com.

What do plants need to grow? _____

_____

How do plants get these things from the log?

Why do we call rotten logs "nurse logs"?

Record evidence of animal life in or on this log.

Why do they live here?

What do they need to live?

How do animals get these things from the log?

What will the log eventually become?

What things help to decay the log?

(continued)

How does this log help soil hold water? _____

_____

How does this log help reduce soil erosion? _____

_____

How does this log help new plants to grow in the plant community?

_____

_____

_____

How does this log illustrate the principle: "Matter is neither created nor destroyed, but only changed from one form into another?"

_____

_____

_____

_____

(The following activity could be done singly or in groups):

YOUR TREE (CHRISTMAS)

1. Is your tree a broadleaf or a conifer? _____

2. Is your tree evergreen or deciduous? _____

3. Is your tree a softwood or a hardwood? _____

4. What is the name (species) of your tree? _____

5. How tall is your tree? (Approximately) _____

6. What is the distance around the trunk at the bottom? _____

7. What is the distance through the center of the trunk? (Diameter)
_____

8. How old is your tree? _____

9. How many ways can you tell? _____

_____

10. In which year did your tree grow the most? _____

11. What could cause the difference in growth each year? _____

_____

12. Look at the ends of the branches on your tree. Draw what you see.

13. If your tree had kept on living, what do you think would have happened to the ends of the branches? _____

_____

14. Look carefully at a twig from your tree. Are there any buds along the twig? If so, draw what you see.

LOST IN THE WOODS?

The best thing is NOT to get lost, so before going on your trip, study a map of the area and learn the direction the streams and drainages flow, where the trails are located, names and location of prominent peaks, etc. Learn how to use your map and compass. When you are traveling in the area, pinpoint your camps and locations on the map. Orient your map to land features every chance you get.

WHEN LOST

If you do become lost, do the following:

1. Keep clam. Do not walk aimlessly. Trust your map and compass. Shelter and warmth are much more important than food.

    (a) To find your position, climb to a place where you can see the surrounding country.

    (b) When you reach a road, trail, or telephone line, follow it. As a last resort, follow a stream downhill.

    (c) Before being caught by darkness, select a sheltered spot and prepare camp, shelter and firewood. Stay in this camp all night.

2. If you are injured and alone, keep calm. Stay where you are, clear an area down to the mineral soil, and build a signal fire with green boughs in it. Usually someone will find you.

3. Signal by 3 blasts from a whistle, 3 shots from a gun, 3 regulated puffs of smoke, or 3 flashes from a mirror or flashlight. Repeat at regular intervals. If your signal is recognized by a searching party, it will be answered by 2 signals. Three signals of any kind either audible or visible, is the nation-wide SOS call. Use it only when in need of help.

4. Notify the county sheriff's office if a member of your party is believed to be lost or in trouble and if it is beyond your resources to find or assist him. Forest Rangers cooperate with the sheriff in rescue work.

WILD EDIBLES

Most plant leaves, fruits, and roots are edible. They may not be as tasty as ice cream, but can keep you alive. If in doubt about a plant--do the following:

1. Put a <u>small</u> raw portion of the plant in your mouth and chew it.

(continued)

DON'T SWALLOW IT: Spit it out and wait to see if there are any ill effects on the mouth or tongue. If not, then --

2. Swallow a small raw portion. Wait for any possible ill effects. If there are none, then --

3. Cook some of the plant (do not add any foreign substance which you may have such as salt, etc.) and swallow a small bit. If no ill effects occur after waiting six to twelve hours, then --

4. Increase the portions and wait. Do this several times. If there are no ill effects, then the food is not harmful. Be sure, in making this test, not to eat other substances which might upset the reliability of the experiment.

(From: Wild Edibles, by Russ Vliet, Philmont Scout Ranch)

Some Wild Edible Plants in Our Woods: Pine nuts, huckleberries, elderberries, miner's lettuce, wood sorrel, salmon berries, cattail roots, new fern leaves and roots, inner bark of trees, wild plum, wild rose flowers and fruits, Oregon grape berries.

Some Poison Plants in Our Woods: Buttercup, larkspur, water hemlock, (in parsley family), poison oak, milkweed, locoweed, certain mushrooms.

Potable Water: Most streams in mountainous areas are pure enough to drink, but if in doubt, boil drinking water 3 to 4 minutes, or add purification tablets before drinking.

LOST KIT

Many people have their own list of essentials that they carry with them at all time when in the woods. These items are a matter of personal preference and experiences. The "Mazamas", a mountain climbing, outdoor and conservation organization of Portland, Oregon, makes it a requirement that the following 10 essentials be carried by all members while hiking in the forest or wilderness areas. The 10 essentials are grouped into four groups for easy remembering:

1. For signaling.....whistle.
2. For fire hauling.....waterproof matches, knife.
3. For finding you way....map, compass, flashlight.
4. For protection.....Extra food and clothing, fire starter, first aid kit, sunburn protection.

A Study of Wildlife

General Information

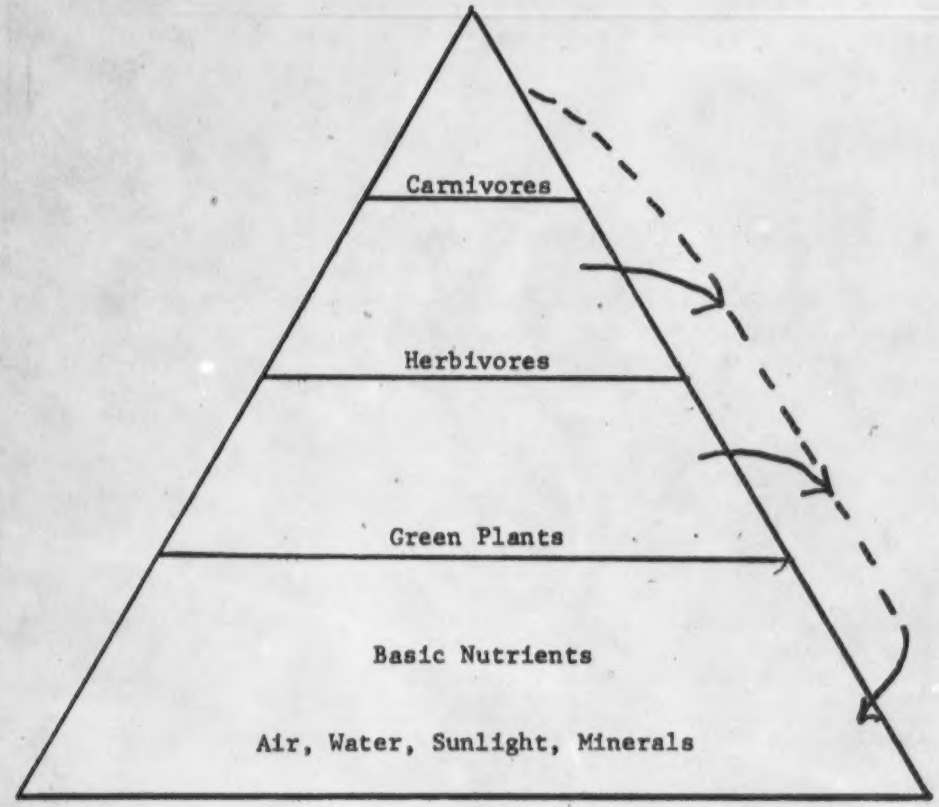
All animals are born, grow to maturity, reach old age, and die. Animals live in a "home range" area. Animals are all dependent upon food, water, and shelter in order to live and survive. If there are more animals than food, some animals will die. The land can feed so many animals and no more. This is called the "carrying capacity".

Some animals are tiny, some are medium size, and some are large. Animals such as the protozoans, worms, crayfish, insects, spiders, clams, and starfish have no backbones. They are called invertebrates. Others such as fish, frogs, snakes, birds, and mammals have backbones and are called vertebrates.

There are different kinds of animals in each study area. We will devote most of our attention to the wild animals which live here. Many of the smaller animals we will see in this outdoor laboratory live in tunnels or burrows underground. Some live mostly in hollow logs, stumps, or in shrubs and trees above ground. Animals which eat other animals are called predators. Many of the mammals including humans, are predators. Those which eat meats are called carnivores, and those which feed only on plants are called herbivores. Some animals, such as deer, elk, and prong-horned antelope, are known as game animals because they provide hunting recreation.

Some animals are useful to man, providing him with meat, leather, and furs. Others help to control destructive insects and small rodents. Mice, rats, chipmunks, and rabbits are important as food for larger mammals such as the cougar, bobcat, coyote and others.

FOOD PYRAMID



A diagram of food pyramid showing general trends in food circulation.

There always has to be a larger number of organisms below each level of life. An example: There must be more green plants than the herbivores (such as mice, deer, beaver, etc.) or these animals run out of food.

There must always be more herbivores than carnivores (man, mountain lion, shrews, etc.) or the carnivores would run out of food.

It is interesting to study the different kinds of animals which live together on a piece of land such as our study area. We can learn how they depend upon each other and the soil, water, and plant life for their existence. This will help us to understand how man fits into the picture and how he affects all other living things. Observe and record the following data.

Field Study Recordings

1. Invertebrates:

Invertebrates are lower forms of animal life which do not have a backbone. Animals in this group would include the one-celled animals known as protazoa. Also included in this group are the sponges, jellyfish, flatworms, roundworms, bryozoa, snails, slugs, clams, earthworms, leeches, crayfish, centipedes, millipedes, spiders, insects, starfish and sea urchins.

Determine what kinds of invertebrates live in the study area. Describe each and tell about its home and its food preferences.

INVERTEBRATES

SIZE & DESCRIPTION	KIND	FOOD PREFERENCES	VALUE

2. Vertebrates are the higher forms of animal life that do have backbones. These are the (1) amphibians, (2) reptiles. (3) fishes, (4) birds, (5) mammals.

Determine what kinds of vertebrates live in the study area. Describe each and tell about its home, its food preferences, and its value.

VERTEBRATES

SIZE AND DESCRIPTION	Group 1, 2,3,4,5	Common Name	TYPE OF HOME	FOOD

3. Observe, sketch and record any animal signs you can find on your field study area. Look for gnawings, tracks, droppings, dust baths, feathers, nests, runways, uneaten food.

ANIMAL SIGN	ANIMAL WHO PROBABLY MADE IT	SKETCH OF SIGN

4. Observe and record the different habitats in which wildlife could live on your field study area. (Streambanks, meadow, woods, rotten log, brush, etc.) List animals that might live there.

HABITAT	ANIMALS THAT COULD LIVE THERE

5. Natural environment which may cause certain animals to move to other areas.

Changes in Habitat Due to Man	Animals that Had to Move

6. Record all the birds you see during your stay at the Outdoor School.

Name of Bird	Where Seen	Identifying Marks

7. How does wildlife effect:

Soil _____

_____

_____

Water _____

_____

_____

Plants _____

_____

_____

Other Wildlife _____

_____

_____

Man _____

_____

_____

_____

Words you should know and remember:

Amphibian--Means "living in two places". These animals hatch from eggs which have been deposited in ponds or streams. They live in water like fish when they are young. Gradually they grow lungs and legs, breathe air, and live on land.

Anadromous--Those fish which spend the greater share of their lives in salt water but migrate into fresh water for reproduction.

Aquatic--Living or growing in water, as a fresh-water environment.

Browse--The shrub plants which are food for wild or domestic animals.

Carnivores--Animals that eat meat.

Carrying Capacity--The maximum number of wild game which a particular range is capable of carrying.

Environment--All those factors which make up the surroundings of any living thing.

Forage--The grasses and weeds which are food for wild or domestic animals.

Forage Production--The amount of food produced annually on the range and available for animal consumption.

Furbearer--Any animal (usually mammal) sought for its fur.

Game Animal--Commonly refers to those animals which are hunted for recreation and are protected by specified closed seasons or bag limits.

Habitat--The total environment which provides food, water, and shelter for wildlife.

Herbivores--Animals which feed only on plants.

Hibernate--To spend the winter months in an inactive condition.

Insect--A small invertebrate animal characterized in adult stage by having a division of the body into head, thorax, and abdomen, three pairs of legs and usually, two pairs of wings.

Lake Rehabilitation--Treatment of a lake with chemical to destroy all fish life in preparation for restocking with desirable game fish species.

Lake Survey--A study of the lake, including sounding and mapping, to learn what physical conditions exist and what aquatic life is present.

Limiting Factor--The factor which outweighs all others in limiting productivity.

Migration--Seasonal movement of animals.

Population Inventory--A measure of the current number of a species of game animal or bird. Since it is impossible to count total population animals are observed per mile of travel on sample routes, and a population trend index is established.

Predator--Any animal which preys on other animals.

Protozoa--One celled animals.

Range--The land upon which big game animals live. (Domestic animals may also live upon such land.) i.e. winter range, summer range.

Reptiles--Like fish, are cold-blooded and their bodies are usually covered with protective scales or scale-like shells. They lay eggs and are air-breathers all their lives.

Rotary Fish Screen--A mechanical device designed to prevent passage of fish from streams into irrigation ditches.

Spider--Any of a number of small, eight legged animals having a body composed of two divisions.

HERE IS A LIST OF THE PLANTS AND TREES NATIVE TO THE SUTTLE LAKE AREA

You may want to check those which you see--

_____Alder

_____Algae

_____Blackberry

_____Cedar

_____Cherry, Wild

_____Chinquapin

_____Clover

_____Currant

_____Dandelion

_____Fern, Bracken

_____Fir, Douglas

_____Fir, White

_____Gooseberry

_____Grass, Blue

_____Grass, Orchard

_____Hazelnut

_____Honeysuckle

_____Horsetail

_____Oregon Grape

_____Pine, Lodgepole

_____Pine, Pondoreosa

_____Pine, White

_____Pine Drops

_____Prince's Pine

_____Pyrola

_____Juniper

_____Larch (Tamarack)

_____Lichen

_____Manzita

_____Maple, Vine

_____Miner's Lettuce

_____Mistletoe

_____Moss

_____Mullein

_____Ocean Spray

_____White Pine Cone

_____Ponderosa Pine Cone

_____Douglas Fir Cone

_____Chinquapin Burr

_____Rose, Wild

_____Rush

_____Sedge

_____Skunk Cabbage

_____Snowbrush

_____Solomon's Seal

_____Strawberry

_____Thistle

_____Trillium

_____Twinflower

_____Willow, Mountain

_____Yew

HERE IS A LIST OF SOME OF THE BIRDS AND FISH TO BE FOUND AT CAMP

You may want to check those which you see--

BIRDS

_____Blackbird, Red-Winged

_____Chickadee (3 species)

_____Flicker

_____Jay, Stèller's

_____Junco

_____Kinglet, Golden-Crowned

_____Kinglet, Ruby-Crowned

_____Nuthatch

_____Robin

_____Sparrow, Song

_____Sparrow, White-Crowned

_____Swallow, Tree

_____Warbler, Audubon's

FISH

_____Dace

_____Kokanee

_____Salmon, Atlantic

_____Sculpin

_____Trout, Brook

_____Trout, Brown

_____Trout, Rainbow

_____Whitefish

SOME LITTLE VERSES

I WROTE FOR A

RAINY AFTERNOON - - -

SOME GREATIVE THOUGHTS

A VERY SPECIAL PAGE
FOR FRIENDS TO SIGN
THEIR NAMES---